

### **Disease transmission from pigs to humans**

Pig to human disease transmission is fairly common aside from the deadly flu epidemic of 1918 and the swine flu outbreak caused by vaccinations in 1976 that killed 113 people and paralyzed an estimated 3600. Porcine Endogenous Retroviruses (PERV) have been found to infect human kidney cells *in vitro*, justifying the British Ministry of Health's decision to postpone the proposed transplantation of pig organs into humans. Retroviruses are of particular concern because they can't be eliminated from the body, making an infected person a carrier for life. Pigs harbor aspergillus fungus which has been a source of central nervous system infection in kidney transplant patients. Piggery workers in Australia were found to be infected with a previously unidentified pig virus that was causing stillbirths and birth defects in pigs. Pigs also carry cytomegalovirus and other herpes viruses, polyomaviruses and parvoviruses that are known to infect humans. Wahba babi is a newly identified pathogen that appeared in Indonesian pigs and people within the last few years. The latest transpecies disaster occurred in Malaysia in the form of the Nipah virus that killed 100 of the 250 persons known to be infected and resulted in the slaughter of about one million pigs to wipe out the disease, which has since reappeared.

### **Transplants bypass the body's normal protective devices**

The danger of transmission of known or as yet unidentified pig viruses via transplanted tissue and organs is acute because they are inserted into the body and hooked up directly to the circulatory, alimentary or pulmonary systems, bypassing the normal barriers of skin, stomach acids and mucosal membranes. Transplanting organs from another species into humans is akin to breaching a dam and inundating the immune system with a torrent of toxins for the body to handle all at once. Once inside a new host, even a host that is not immune-compromised, pathogens have the opportunity to multiply with no opposing organisms in place to impose limits on their expansion. Israel's Dr Andre Menache has compared this situation to a group of naughty children going berserk after being admitted to a new playground without supervision.

An experiment in Sweden reported by the Committee on Science and Medicine of the Council of Europe Parliamentary Assembly involved transplanting pancreatic islet cells from fetal pigs into human diabetics. Ten of these patients were subsequently found to be harboring antibodies to swine influenza and five were found to have antibodies to porcine parvovirus.

Other pig cell transplants have been performed without antibodies to pig diseases being identified, but British virologist Robin Weiss asked, "If there are negative results, does it mean that no one's been infected or that you can't detect it?"

Disease transmission is particularly worrisome in the case of diseases like Creutzfeldt Jakob's disease that have a long latency period before symptoms start to appear and in the case of retroviruses, which cannot be eliminated once they are established.

### **Interspecies differences interdict cross-species transplants**

Pig organs have evolved to support an animal with a lifespan of 10 years as opposed to 80 or more years for humans. In addition, their organs are designed to function differently from the corresponding organs in humans:

- Pigs are a horizontal animal. Their hearts have not evolved to pump blood against gravity into the brain of an upright animal. This, besides the fact that they have evolved to support an animal with a shorter life span is sufficient reason not to attempt pig-to-human transplants in addition to the fact that all those that have been attempted have predictably failed as have transplants from other primates.
- There is a major difference in the way pig and human kidneys process uric acid. Humans reabsorb 90 percent of the amount that is processed whereas pigs secrete it. There is also a hormonal difference affecting the production of red blood cells.
- Pig livers do not produce guanase, an enzyme that affects the functioning of the human immune system. Pig livers do contain uricase, however, which breaks down uric acid which humans metabolize as is.

Even subtle interspecies differences such as the above can upset the balance each individual human body is constantly working to maintain.

### **Immune systems of transplant patients already compromised**

To compound the problems presented by interspecies differences, transplant patients' immune systems are deliberately suppressed with drugs in order to prevent rejection of the transplants, which a healthy immune system would see as a foreign invader and promptly reject. Having a weakened immune system makes transplant recipients more susceptible to the opportunistic expansion of any stray organisms that might hitch a ride with a transplant.

### **Genetically altered animals**

Compounding the problem still further is the fact that the pigs used will have been genetically altered opening up still more possibilities for acquiring and transmitting existing and as yet unknown diseases. Xenotransplant proponents claim that their pigs will be carefully screened for viruses, bacteria, fungi and parasites, but, as Australian virologist Peter Kirkland wrote in *New Scientist*, "You can't screen for viruses you don't know about."

## **Transplants more indicative of failure than triumph**

We tend to be so dazzled with the accomplishments of modern medical technology that we lose sight of the fact that, far from being the medical triumph they are touted to be, most transplants are an acknowledgement of medical failure. Most of the patients waiting for a transplants would not be in that state if they had observed a few healthy precautions earlier in life. Poor diet and lack of physical exercise cause arteries to clog and organs to deteriorate. Just as Americans have reduced heart disease in the last few years by adopting healthier habits, they can avoid the deterioration of the body as a whole and stop being a drain on the organ supply which might than be adequate for people in need of organs for reasons beyond their control.

## **Supply of organs for transplants can be increased**

Meanwhile, the present supply of human organs can be greatly enhanced by more aggressive campaigns persuading people to donate the organs they are leaving behind when they check out. One of the most effective methods of procuring more human organs as practiced in Austria and Belgium is to adopt a "presumed consent" system by assuming that the organs of anyone who dies are available for transplants unless the person has left word to the contrary or surviving family members have a problem with it. Deciding ahead of time avoids survivors having to make what can be an emotional decision at a time when they are overcome with grief at the loss of their loved one.

Transplants, even those not involving another species, are not a desirable option for many reasons including the necessity for immuno-suppression to prevent rejection and the transmission of human disease pathogens. When all other treatment has failed, however, and no other option is available, it is good to have a more or less steady supply of human donor organs rather than relying on organs from a different species with different characteristics such as a shorter life expectancy and microorganisms with the potential to not only attack the organ recipient but the human population as a whole.

Other options now include

- growing some organs or parts of organs from the patients' own cells
- transplanting bone marrow from a healthy individual with a good match to aid the body to perform its own repairs
- transplanting a small piece of a healthy liver into several individuals rather than putting the entire organ in one person.
- Japanese researchers have recently invented a new technique using trehalose and perfluoro-carbon to stabilize cell membranes and freezing rat organs for delayed or future use. While the practical use of this technique to bank human organs is still several years away, it is another indication that the supply of human organs can be made to meet the demand.

### **Financial considerations**

In addition to all the medical and public health caveats to both xenotransplants and allotransplants, there is the practical matter of the monetary effect, in addition to the health effects, on the human population as a whole.

Many Americans are unable to afford basic health care or insurance. It is unfair that the government should contribute public money to developing transplants, especially dubious xenotransplants, for the benefit of the minority of people who can afford them when so many more are unable to afford diagnosis and treatment of their health problems.

Keeping pigs in a controlled environment to prevent exposure to bacteria, viruses, fungi, and parasites is an expensive undertaking compared to using organs from people whom medical treatment failed to save. The cost of their medical treatment is not a factor because they would have received it anyway.

Because of the possibility of dangerous new human diseases resulting from xenotransplants, there is also the cost of monitoring the recipients of xenotransplants. One of the worst scenarios that has been suggested is maintaining separate colonies of xenotransplant recipients—like the leper colonies of old—to protect the rest of the human population from rampaging viruses and bacteria.

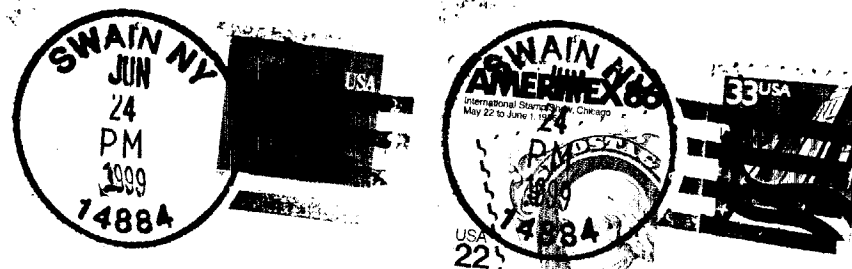
### **The best all-round solution**

The best long-term solution to the organ shortage problem is to reduce the need for transplants by educating and persuading more people to adopt a healthy lifestyle. If people would take responsibility for their own health instead of expecting doctors to patch them up after years of abusing their bodies with unhealthy eating (to say nothing of tobacco, alcohol and drugs), fewer people would need transplants. The supply of donated organs would then come closer to the smaller number of people still in need of them.

Respectfully submitted,

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